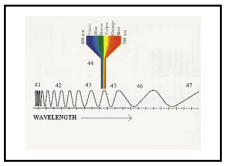
Activity #4: Introduction to the Electromagnetic Spectrum –Student's Copy



URL: http://imagine.gsfc.nasa.gov/docs/science/know_l1/emspectrum.html

Make no marks on this paper. Place all responses on the answer sheet provided.

1. What is the name given to a bunch of types of radiation when scientists want to talk about them as a group?
2. What do we call energy that travels and spreads out as it goes?
3. Are aircraft and shipping radio band wavelengths longer or shorter than the waves you receive on your radio when you tune into 107.3 on your FM dial?
4. Name something else besides a radio station that can emit radio waves.
5. What can these radio waves tell you about the object that emits them?
6. Besides cooking their popcorn in 3 minutes and 20 seconds, for what do astronomers use microwaves?
7. What type of radiation is used to map the dust between stars in space?
8. What substances in the universe emit X-rays?
9. True or false: The light emitted by fireflies is considered visible radiation.
10. –12. Name three things that can produce gamma rays.
13. Are gamma rays and radio waves really different things?
14. What is the mass of the particles that form the stream of electromagnetic radiation?
15. In what type of pattern do these particles travel?
16. What is the speed of these particles?
17. What is the bundle of energy called that is contained in these particles?
18. What is the difference between the various types of electromagnetic radiation?
19. True or false: Because microwaves can actually be used to cook your food, they contain lots of energy.
20. What are the most energetic waves of all?

21 – 23. Name three terms that can be used to describe the electromagnetic spectrum?

24. In what units is frequency is measured?
25. Give a one-word term for your answer to # 24.
26. What units are used to measure wavelength?
27. Electron-volts measure what?
28. True or False: Scientists LOVE to use big numbers---even when they don't have to.
29. The radio portion of the EM spectrum contains waves of what lengths? (Give a range.)
30. What is the frequency range of these radio waves?
31. What is the term for a millionth of a meter?
32. Which is larger: an angstrom or a nanometer?
33. Name the colors that fall between 400 and 700 nanometers in wavelength.
34. In what units do scientists refer to the energies of the photons in the UV to gamma-ray region of the EM spectrum?
35. True or False: Gamma-rays have energies greater then 100 thousand electron volts.

36-37. Name two types of radiation that can reach the earth from space.

38. What types of radiation can be observed from mountaintops or from telescopes in airplanes?
39. Balloons with instrumentation aboard can reach what altitudes?
40. What is the best vehicle for long-term observations of EM radiation from space?

(continued)

41-47. Clicking on the link “Show me a chart of the wavelength, frequency and energy regimes of the spectrum!” label the type of radiation (i.e., radio gamma, etc.) of the electromagnetic spectrum that matches the corresponding wavelength in the diagram below.